CEDAR CREST COLLEGE
Biology 327 – Microbial Pathogenesis and Human Immunology
Course Syllabus - Part I: Overview
Spring 2010

INSTRUCTOR INFORMATION

Instructor: Dr. Amy J. Reese

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Office Hours: Monday 1:00 – 1:50 pm, Tuesday 3 – 3:50, Wednesday 4:00 – 4:50 pm, and Thursday 11:00 – 11:50 pm. Other hours by appointment.

GENERAL COURSE INFORMATION

Biology 327: Microbial Pathogenesis and Human Immunology, 4 credits (3 if not taking lab)

Course website: http://www2.cedarcrest.edu/academic/bio/areese/index.html

Course Prerequisites: BIO 227, 236 (or old 231 and 222) or permission of the instructor

Course Description:

This course will introduce the microorganisms responsible for many common diseases and the ways in which the human body can protect itself against these diseases. Topics include immunology, bacteriology, virology, mycology, parasitology, and microbial pathogenesis. Lectures, laboratory work, current events, literature research, individual and group projects will be integral parts of this course.

Materials:

- The specific materials for lectures can be found on the separate handout *Biology 327, Microbial Pathogenesis and Human Immunology; Course Syllabus – Part II: Lecture Schedule & Assignments*.
- The specific materials for lab can be found on the separate handout *Biology 327, Microbial Pathogenesis and Human Immunology; Course Syllabus – Part II: Lecture Schedule & Assignments*.

Format:

- Lecture 3 hours per week in Oberkotter Center for Health and Wellness 1
- Laboratory 3 hours per week in Oberkotter Center for Health and Wellness – lab 2

Schedule:

- The specific schedule for lectures can be found on the separate handout *Biology 327, Microbial Pathogenesis and Human Immunology; Course Syllabus – Part II: Lecture Schedule & Assignments*.

- The specific laboratory schedule can be found on the separate handout *Biology 327, Microbial Pathogenesis and Human Immunology; Course Syllabus – Part III: Laboratory Schedule & Assignments*.

Course Objectives:

At the successful completion of the course, the student should be able to:

1. Describe the different types of pathogens, classical symptoms and likely affected body sites.
2. Discuss the specific health risks associated with particular groups based on age, location, leisure activities, health status, pets, and previous medical history.
3. Understand basic immunology and the interactions between host and pathogen.
4. Understand issues of commensal flora, organism transmission, and portals of entry.
5. Become familiar with common terminology associated with medical microbiology.
6. Discuss preventions, precautions, vaccinations, community health, cultural issues, biohazard levels, and the role of the media in issues of human health.
7. Learn various laboratory methods appropriate for clinical or research applications of medical microbiology.
8. Understand epidemiology, concepts of pathogenicity, virulence, disease mechanisms, antibiotic resistance, and types of disease outbreaks.
9. Describe roles of acute, chronic, symptomatic, asymptomatic/subclinical, and reactivation in disease settings.
10. Be familiar with approaches to diagnosis, case study analysis, and basic treatment concepts.

COURSE OUTCOMES & ASSESSMENT

Successful Course Completion Outcomes:

1) Demonstrate the ability to engage in critical analysis and qualitative reasoning.
   - Students will study the patterns of common infectious disease pathogens and affected body sites and symptoms.
   - The students will practice and apply their skills with new case studies and know what pieces systematically to look for and how to predict causative microbial agents and appropriate diagnosis.

2) Demonstrate the ability to understand and respond to issues of local, national, and global significance.
   - The student will learn critical analysis skills for addressing microbiology and microbial pathogenesis portrayed in the general public media at the local, national, and global levels.
   - Students will practice articulating the science behind such material in discussion and presentation format to address current medical microbiology.

Assessment:

1. Students will take 3 major lecture exams and a comprehensive final exam on the content areas.
2. Students will prepare for and participate in regular discussions on current events, case studies, and related course topics.
    a. Each student should prepare at least one typed page (usually two or three) of discussion points with references for each discussion.

b. Discussion preparation assignments should include an introductory paragraph, data or material collected with references, and a summary paragraph to wrap up and conclude information gathered and prepared for the class discussion.

c. During discussions, each student should plan on verbally contributing at least one point of prepared and referenced material towards each discussion.

d. Additional points raised during the discussion should be added by hand to the prepared page, and both pieces submitted at the end of class as a part of discussion preparation. These will be assessed and returned to the students for further study.

3. Four quizzes will be given in the laboratory to assess the student ability to understand the methodology and data interpretations of the techniques covered in the laboratory.

STUDENT ASSESSMENT & EVALUATION

Grading & policies:

80%	Lecture
20%	Laboratory work
100% total	

Students enrolled in only lecture or lab will be graded accordingly.

Final grade %	A 93-100	A- 90-92.9	B+ 87-89.9	B 83-86.9	B- 80-82.9	C+ 77-79.9	C 73-76.9	C- 70-72.9	D+ 67-69.9	D 60-66.9	F <60

COURSE POLICIES AND STUDENT RESPONSIBILITIES

A. Academic Policies:

1. I fully support the "Honor Code" and "Honor Philosophy" set out by the *Cedar Crest College Student Handbook*.
2. I fully support the "Academic Standards of Integrity" and the "Statement on Academic Dishonesty or Plagiarism" set out by the *Cedar Crest College Student Handbook*. This includes but is not limited to the following statements.
   - Plagiarism will result in a zero for the assignment.
   - Cheating in lecture or lab will result in a zero for the test/assignment.
   - Plagiarism and cheating violations will be reported to the Provost, Academic Services, and/or the Honor & Judicial Board, and may result in failure of the course.
   - Violations or violation intensions of these statements should be brought to my attention.
   - I will report violations of "Academic Standards of Integrity" and incidents of "Academic Dishonesty or Plagiarism" as necessary.
3. I fully support the "Classroom Protocol" addressed in the *Cedar Crest College Student Handbook* ("Community Standards for Academic Conduct" Section A, part I). I expect the classroom to be an environment in which all students can participate and learn. Behaviors that

detract from this ideal environment (as listed in the "Classroom Protocol," mentioned below and as decided upon by the class should be avoided at all costs.

4. Please refrain from all activities that detract from the learning of others around you. This includes but is not limited to the following areas. Please silence cell phones during class unless there is an impending emergency, no texting or messaging, do not routinely come to class late, do not eat or talk in ways that are distracting to those around you, and do not leave the classroom except for the bathroom or related emergencies. Reasonable interruptions should be cleared in advance.
5. If the College is canceled for weather or other reasons and it is an exam day, we will plan on having the exam on the next scheduled class day unless I notify you otherwise. If the College is canceled the lecture before we have an exam, the exam will remain as scheduled if we have new section material scheduled for the lecture immediately proceeding each exam. If the College is delayed (say until 10 am), we will adhere to the delayed timeframe, even on an exam day.

B. Lecture Attendance Policies:

1. You are expected to attend lecture and to come to class prepared. Attendance will be documented. Extended unexcused absences may result in up to a 10% reduction of the total lecture grade. Unexcused absences for lecture exams or finals will result a zero for that exam.
2. Graduate school and other related interviews are a common occurrence during the spring semester of the senior year. If you have such an interview, congratulations! I am flexible about this, and most of these visits occur on Fridays. Please simply let me know in advance as to when you will miss lecture.
3. In the unfortunate event of an unplanned absence due to a personal or family medical emergency, you must contact the Acting Dean of Student Affairs (Denise O'Neill: 610-437-4471, x4680; doneill@cedarcrest.edu) to obtain appropriate documentation for an excused absence. These offices will contact me. You should also contact me to make alternative coursework plans.
4. For expected absences or early departures due to Cedar Crest-sanctioned events, please notify me as soon as possible and see your coach or instructor for official documentation in advance.
5. You are expected to be at lecture on either side of spring and Easter break. Scheduling family vacations during the non-break sections of the semester is highly unadvisable.
6. It is your responsibility to obtain notes and handouts from a classmate for lecture absences.

C. Laboratory Attendance Policies:

1. Laboratory attendance is mandatory by college policy. Each unexcused absence will result in a 10% reduction of your total laboratory grade. Each excused absence without made up work will result in a 5% reduction of your total laboratory grade. Each unexcused absence with made up work will also result in a 5% reduction of your total laboratory grade. See point #4 and its sub-bullets below. Unexcused absences on the day of a practical will result in a zero for that exam.
2. Graduate school and other related interviews are a common occurrence during the spring semester of the senior year. If you have such an interview, congratulations! Please try very hard not to miss lab (and if you do, get it officially excused).
3. For expected absences or early departures due to Cedar Crest-sanctioned events, please notify me as soon as possible and see your coach or instructor for official documentation in advance. You are responsible for coordinating with me as to how to make up any missed lab work.

4. You are expected to be at lab on either side of spring and Easter break. Scheduling family vacations during the non-break sections of the semester is highly unadvisable.
5. Only emergencies or special circumstances will be allowed as reasons for any make-up lab. Any adjustments must fulfill the following 3 requirements:
    - You must notify me on the day of or before the lab. This should happen before the time of the scheduled lab, pending valid emergencies.
    - I receive official documentation (such as an email from the Health Center, Dean of Academic Affairs, or Academic Services) that is considered valid (at my discretion) within one week of the absence.
    - The lab must be completed within 48 hours of the absence. It is your responsibility to contact me as soon as possible to schedule any approved make-up lab. Due to the nature of lab work and supplies, some labs may not be able to be made up as performed in class.

D. Lecture & Lab Assignment Policies:

1. Assignments are to be done as scheduled and work to be handed in at the beginning of the class during which it is due unless otherwise instructed. Late penalties are 5% per day and 20% per week, of the total points possible for the assignment.
2. If you miss class on a day on which an assignment is due, it is your responsibility to get the assignment in on time or as soon as possible (to minimize your deducted points). If you miss class on a day on which an assignment is passed out, it is your responsibility to get a copy of the uncompleted assignment from a classmate.
3. Do not use pink or red ink/pencil for assignments or discussions you will be turning in.

E. Lecture & Laboratory Quiz, Exam & Final Exam Policies:

1. You are expected to sit with a space between you and the next student whenever possible and may be given exam seat assignments.
2. You are expected to be at each exam on time and as scheduled. If you arrive late for an exam or quiz, in lab or lecture, you forfeit that time in taking the test. Unexcused absences on the day of an exam will result in a zero for that exam. Excuses exam absences must fulfill the requirements listed above for excused laboratory absences (see C.4 policy for excused lab absences).
3. Some make-up quizzes and exams may not necessarily correspond to the regular test format. They will be given at a designated time and may also be scheduled during the week of final exams.
4. Before each quiz/exam, all material must be placed in the front or side of the room as directed. Purses, papers, notebooks, books, PDAs, cell phones, headphones, guests, calculators or other devices are not allowed unless otherwise directed. Exams should be in ink (not red or pink).
5. Your obligation for this course includes attendance at the final exam on the day and time scheduled by the Registrar's Office. You should not make travel arrangements (nor should anyone else make them for you) until the final exam schedule is published. If you must make plans early, you should schedule your travel after the last final exam day.
6. Final exam times cannot be rearranged unless three or more exams occur within a 24-hour period. Any exception must be petitioned and reviewed by the Department of Biological Sciences within a week of when the final exam schedule is announced in class.

F. Academic Services:

1. Disabilities Services:
    - Students with disabilities who wish to request accommodations should contact the Advising Center or visit http://www2.cedarcrest.edu/acadadvising/ada_file.html within the first two weeks of class.
2. Academic Support:
    - The Advising Center provides many resources, such as study skills resources and peer tutoring, via email at advising@cedarcrest.edu, on campus site in Curtis 109, their website http://www2.cedarcrest.edu/acadadvising/index.html, or by phone at 610-606-4628.
3. Course resources:
    - There are no bonus points associated with the course.
    - A sense of microbial fun and wonder is associated with the course!

CEDAR CREST COLLEGE

Biology 327 – Microbial Pathogenesis and Human Immunology

Course Syllabus - Part II: Lecture Schedule & Assignments

Spring 2010

COURSE MATERIALS:

- Marjorie Kelly Cowan and Kathleen Park Talaro, *Microbiology: A Systems Approach*, 1st or 2nd ed., McGraw Hill, 2006/2009 or other microbiology text (recommended as a resource).
- Abigail A. Sayler and Dixie D. Whitt, *Revenge of the Microbes: How Bacterial Resistance is Undermining the Antibiotic Miracle*, American Society of Microbiology, 2005 (required).
- Lydyard *et al*. *Case Studies in Infectious Diseases*, Garland Science, 2010 (required).
- A lecture note packet will be available for purchase from the bookstore at the cost of printing. A 3 ring binder is highly recommended to organize these lecture notes.

Lecture schedule subject to change if needed.

DATE	LECTURE	FOR CLASS
Jan 19 – W Lecture 1	• Themes and goals of the course • Discussion of historical impact, ways to classify diseases & organisms • Overview of the microbes of infectious diseases, review of organism types • Introduce discussion topic 1 and preparation	Review microbiology basics
Jan 21 – F Discussion 1	*Topic 1: Human host and biota interactions*. See information on discussion topics, essays and participation below.	Read (at least) Cowan 13.1. Write essay and be prepared to discuss topic.
Jan 25 – M Lecture 2	• Infection/disease progression	Cowan: 13.2
Jan 27 – W Lecture 3	• Infection/disease tracking- Epidemiology • Introduce discussion topic 2	Cowan: 13.2 – 13.3
Jan 29 – F Discussion 2	*Topic 2: Epidemiology & USA Public Health*. See information on discussion topics, essays and participation below.	Research topic, write essay and be prepared to discuss topic.
Feb 1 – M Lecture 4	• Steps and types of diagnosis (diagnosis day 1) • Ways to identify microbes, specimens, phenotypic & genotypic methods	Cowan: 17.1 – 17.4
Feb 3 – W Lecture 5	• Immunology methods -1 (diagnosis day 2) • Introduce discussion topic 3	Cowan: 17.5
Feb 5 – F Discussion 3	*Topic 3: Issues of global public health* See information on discussion topics, essays and participation below.	Research topic, write essay and be prepared to discuss topic.
Feb 8 – M Lecture 6	• Immunology methods -2 (diagnosis day 3) • Introduce discussion topic 4	Cowan: 17.5
Feb 10 – W Lecture 7	• Introduction to lines of host defense • 1st line of defense, non-specific	Cowan: 14.1 – 14.3

Feb 12 – F Discussion 4	*Topic 4: Revenge of the Microbes Chapters 1-4.* See information on discussion topics, essays and participation below. Introduce handout of commonly used antibiotics for reference & resource.	Read chapters, write essay and be prepared to discuss topic & ponder questions.
Feb 15 – M	**Exam I (Lectures 1-6 & Discussions 1-3)**	
Feb 17 – W Lecture 8	• 2nd line of defense, innate response	Cowan: 14.4
Feb 19 – F Lecture 9	• Specific immunity – the adaptive system	Cowan: 15
Feb 22 – M Lecture 10	• Antibodies & antigens	Cowan: 15
Feb 24 – W Lecture 11	• B cell response, T-cell response and cell-mediated immunity	Cowan: 15
Feb 26 – F Lecture 12	• Immune system regulation & disorders • Introduce topic 5	
Mar 1 – M Discussion 5	*Topic 5: When the immune system causes problems.* See information on discussion topics, essays and participation below.	Research topic, write essay and be prepared to discuss topic.
Mar 3 – W Lecture 13	• Disease prevention, types of immunity, types of vaccines • Introduce topic 6	Cowan: 15
Mar 5 – F Lecture 14	• Vaccines & immunizations • Introduce discussion topic 6	Cowan 15
Mar 8 – 12	**SPRING BREAK**	Finish *Revenge of the Microbes*
Mar 15 – M Discussion 6	*Topic 6: Pros and cons of vaccinations.*	Research topic, write essay and be prepared to discuss topic.
Mar 17 – W	**Exam II (Lectures 7-14, Discussions 4-6)**	
Mar 19 – F Lecture 15	• Infectious diseases of the respiratory tract, overview & viral infections	Cowan: 21 Lydyard cases: 18, 29
Mar 22 – M Lecture 16	• Infectious diseases of the respiratory tract, bacterial infections	Cowan: 21 Lydyard cases: 23, 35
Mar 24 – W Lecture 17	• Infectious diseases of the resp. tract, fungal • Introduce case study discussion 8	Cowan: 21 Lydyard cases: 1, 16
Mar 26 – F Discussion 7	*Topic 7: Revenge of the Microbes Chapters 5-8.* See information on discussion topics, essays and participation below.	Read chapters, write essay and be prepared to discuss topic & ponder questions.
Mar 29 – M Lecture 18	• Infectious diseases of the skin & eyes • Introduction of discussion topic 8	Cowan: 22 Lydyard cases: 39, 27, 14
Mar 31 – W Lecture 19	• Infectious diseases of the skin & eyes	Cowan: 22 Lydyard cases: 33, 36
Apr 2 – 5	**BREAK**	
Apr 6 – T **MON SCHEDULE** Discussion 8	*Topic 8: Case studies (respiration, skin & eyes).* See information on discussion topics, essays and participation below.	Research case study or topic, write essay and be prepared to present to class & lead discussion.

Apr 7 – W Lecture 20	• Infectious diseases of the gastrointestinal tract	Cowan: 18 Lydyard cases: 3, 12
Apr 9– F Lecture 21	• Infectious diseases of the gastrointestinal tract	Cowan: 18 Lydyard cases: 5, 26, 11
Apr 12 – M Lecture 22	• Infectious diseases of the cardiovascular and lymphatic systems	Cowan: 20 Lydyard cases: 9, 17, 28, 32, 19
Apr 14 – W Lecture 23	• Infectious diseases of the cardiovascular and lymphatic systems • Introduce case study discussion 9	Cowan: 20 Lydyard cases: 2, 30
Apr 16 – F Discussion 9	*Topic 9: case studies (GI, cardiovascular & lymphatic system)* See information on discussion topics, essays and participation below.	Research case study or topic, write essay and be prepared to present to class & lead discussion.
Apr 19 – M	**Exam III (Lectures 15-23, Discussions 7-9)**	
Apr 21 – W Lecture 24	• Genitourinary/Urogenital day 1	Cowan: 23 Lydyard cases: 10, 20
Apr 23 – F Discussion 10	*Topic 10: <u>Revenge of the Microbes</u> Chapters 8-end*	Read chapters, write essay and be prepared to discuss topic & ponder questions.
Apr 26 – M Lecture 25	• Genitourinary/Urogenital day 2	Cowan: 23 Lydyard cases: 24, 4
Apr 28 – W Lecture 26	• Genitourinary/Urogenital day 3	Cowan: 23 Lydyard cases: 15
Apr 30 – F Lecture 27	• Infectious diseases of the central nervous system • Introduce case study discussion 11	Cowan: 19 Lydyard cases: 25, 21
May 3 – M Lecture 28	• Infectious diseases of the central nervous system	Cowan: 19 Lydyard cases: 37, 38
May 5 – W **FRI SCHEDULE** Discussion 11	*Topic 11: case studies (genitourinary, CNS)* See information on discussion topics, essays and participation below.	Research case study or topic, write essay and be prepared to present to class & lead discussion.
TBA	**FINAL EXAM (Cumulative w/ emphasis since exam III, lectures 24-28 and discussions 10 & 11)**	

LECTURE GRADING

Lecture breakdown percentages

50% = 3 exams
25% = regular discussion write-ups & in-class discussion (drop of lowest grade)
25% = cumulative final

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The preparation and participation in discussions for this class are worth one quarter of your grade. Some discussion will present an opportunity for you to further explore material presented in class. Often you will be able to address a particular sub-topic of your own interest (perhaps from a list). Other discussions are meant to help you review material and to make additional connections. It is a chance for you to learn with and from the research of your classmates. We will also likely tie in related aspects of our daily lives or of current events as appropriate and inspired.

In order to demonstrate your preparation for each discussion, you should begin by researching the topic. This may take you to course related books, other printed material, or to sites online. Sometimes I may guide you to specific resources, other times you may be instructed to find them on your own. After you have done your topic research, you should type a 1-3 page double-spaced essay addressing the topics above. For each discussion essay, you should include an introductory paragraph, discussion of the specific topic, and a conclusion paragraph. You should use standard methods of citations & references in all cases. References do not need to be on a separate page. It is fine for these short essays if they are in first person, as they are usually your reflections on your research.

In class, you will be expected to share an aspect of what you found. The presentation of such will vary depending on the topic, but be prepared to discuss what you found or to lead others in a discussion. Because of topics and class size, some days there will be pairs of students presenting or two students offering their findings on the same topic. Essays will be turned in at the end of discussions.

Discussion 1- prepare to address the following about biota

1. Differences between resident, transient & opportunistic biota
2. Symbiotic relationships of mutualism, parasitism, antagonism, & commensalism
3. How organisms can change from one type to another & the issues with labeling biota with one term
4. Where natural biota is found
5. What is the most interesting thing you found out about natural biota?

Discussion 2 – prepare to discuss the following about microbial diseases in the US

1. What are the top 10 common infectious diseases of which the average individual in the US should be aware? What microbes cause these diseases?
2. Select one of the following groups (or other related topics) to address the additional infectious diseases for which they are at particular risk.
    a. Infants & toddlers, preschoolers
    b. Elderly
    c. Individuals pregnant/nursing
    d. Owners of pets or exotic pets
    e. Folks w/ many outdoor hobbies
    f. Suffered previous (specific) illnesses
    g. Adolescents-college age
    h. Endemic to various parts of US
    i. Hospital acquired infections
    j. Homeless, others on streets, w/ limited choices, high exposure

Discussion 3 – prepare to discuss the following about microbial diseases in the world

1. What are the top 10 common infectious diseases outside of the US? What microbes cause these diseases? Use the World Health Organization as your main source of information.
2. Select a disease or aspects of global health to address in more detail, such as one of the following:
    a. Malaria
    b. Tuberculosis
    c. Helminthic worm infections
    d. Poor water quality
    e. Flu/Avian flu/Swine flu
    f. Outbreaks
    g. HIV/AIDS
    h. Polio
    i. Women's health issues
    j. Specific issues for travelers

Discussion 4 – prepare to discuss the first 4 chapters of *Revenge of the Microbes*

1. Discuss your general impressions of the topic so far in an opening paragraph.
2. Try your hand at answering some specific points to ponder from the book chapters as assigned. I recommend you tackle at least one for each chapter in your write-up.
3. Wrap up with a summary of this section and what has struck you so far in your reading.

Discussion 5 – prepare to discuss issues of when the immune system over or under responds

1. Discuss the general issues surrounding the over or under response of the immune system.
2. Select a disease/reaction to address in more detail, such as one of the following.
    a. Type I hypersensitivity: Systemic anaphylaxic response to penicillin
    b. Type I hypersensitivity: Localized anaphylaxis or allergy to fungal spores
    c. Type II cytotoxic reaction: hemolytic disease of the newborn
    d. Type II cytotoxic reaction: Thrombocytopenic purpura
    e. Type III immune complex reaction: glomerulonephritis
    f. Type III immune complex reaction: bird fancier's disease
    g. Type IV delayed cell-mediated, infectious allergy: tuberculin test
    h. Type IV delayed cell-mediated, contact dermatitis: poison ivy
    i. Type IV delayed cell-mediated, tissue rejection: host vs graft or graft vs host
    j. Autoimmunity – many possibilities: rheumatoid arthritis or rheumatic fever
    k. (Primary, genetic) Immunodeficiency – many possibilities & defects in different areas:
        i. Agammaglobulinemia (B cell defect)
        ii. thymic aplasia (T cell defect)
        iii. ataxia-telangiectasia (combined B/T defect)
        iv. Chédiak-Higashi syndrome (phagocyte defect)
3. You may find it helpful to explain why your chosen disease/reaction is classified the way it is and how it is different from the other types of classifications.
4. Relate your chosen disease/reaction to what we covered in class (tie it in as an example in order to help your classmates and not overwhelm them).

Discussion 6 – prepare to discuss the pros and cons of vaccines

1. This is a hot topic in many circles. Are some vaccines a risk for some individuals? Why? What are the overall benefits and risks?
2. Select a vaccine. Review what it is for, how it is made, and how it works. Discuss efficacy, target group it is aimed at and why, any individuals at risk, the benefits, and any public hype, etc.
    a. Hep B
    b. DTaP
    c. Hib
    d. IPV
    e. PCV
    f. MMR
    g. Var
    h. HepA
    i. Seasonal influenza
    j. H1N1 influenza
    k. Rotavirus
    l. Meningococcal
    m. HPV
3. Wrap up with what you'd like the general public to know about this vaccine.

Discussion 7 – prepare to discuss chapters 5 – 8 of *Revenge of the Microbes*

1. Discuss your general impressions of this section of the book.
2. Try your hand at answering some specific points to ponder from the book chapters as assigned. I recommend you tackle at least one for each chapter in your write-up.
3. Wrap up with a summary this section and what has struck you so far in your reading.

Discussions 8, 9 & 11 – prepare to discuss case studies and microbes of different body systems.

1. Case studies may be done in different ways. You may be given or assigned a particular case study or asked to write one based on a specific body system organism.
2. Case studies may be assigned to individuals or to pairs of students, depending on the body system and class size.
3. To prepare for class, you are expected to present the case study in writing, analyze it (walking through how you determined the causative agent, etc.), and then write a summary paragraph. Handouts will be addressed if necessary.
4. In class, you will be expected to briefly present the case. You should then expect to guide your classmates through a discussion and determination of the causative agent or as is relevant to the situation.

Discussion 10 – prepare to discuss chapters 9 – the end of *Revenge of the Microbes*

1. Discuss your general impressions of this section of the book.
2. Try your hand at answering some specific points to ponder from the book chapters as assigned. I recommend you tackle at least one for each chapter in your write-up.
3. Wrap up with a summary of what has struck you the most in reading this book.

CEDAR CREST COLLEGE

Biology 327 – Microbial Pathogenesis and Human Immunology

Course Syllabus – Part III: Laboratory Schedule and Assignments

Spring 2010

Course Materials:

- Bound laboratory notebook (required). If you have room, you may use your Bio 227 notebook.
- No specific lab manual, although your Bio 227 lab manual would be useful. You will receive some handouts. A 3-ring binder (1.5 – 2 inch) and colored pencils are also recommended.

Schedule:

Jan 21	Lab 1: Erythrocyte fragility
Jan 28	Lab 2: Epidemic! Clinical microbiology in the 21st century. Trip to a clinical microbiology laboratory.
Feb 4	Lab 3: Blood typing & WBC slide preparation
Feb 11	Lab 4: Passive Agglutination ***QUIZ** 1 (on labs 1-3)*
Feb 18	Lab 5: Double-gel diffusion exercises with antibody interactions & WBC count
Feb 25	Lab 6: ELISA methods
Mar 4	Lab 7: Antibiotic resistance ***QUIZ 2** (on labs 4-6)*
Mar 11	**SPRING BREAK – NO LAB**
Mar 18	Lab 8: Case study – Respiratory tract
Mar 25	Lab 9: Case study – Respiratory tract, part II
Apr 1	Lab 10: Case study – Skin/surface ***QUIZ 3** (on labs 7-9)*
Apr 8	Lab 11: Case study – Gastrointestinal tract
Apr 15	Lab 12: Case study – Cardiovascular & lymphatic system
Apr 22	Lab 13: Case study – Genitourinary/urogenital system
Apr 29	Lab 14: Case study – Central nervous system & systemic ***QUIZ 4** (on labs 10-14)*

Laboratory schedule subject to change if needed.

SAFETY REGULATIONS

Laboratory dress:

1. **A laboratory coat is mandatory whenever working with live organisms or hazardous chemicals.** For us, this will be every lab. Work in the lab will not be allowed without a lab coat.
2. **Covered toed-shoes are required for lab activity**. Flip-flops will not be allowed in the lab. Entry into the lab will not be allowed without appropriate footwear. Plan appropriately.
3. **It is also highly recommended that you not wear shorts in the lab**. If a test tube of media and bacteria drops you want to protect your feet and below your lab coat.
4. **Glasses are safer in lab than contacts**. We will not generally require safety goggles, however they are available should you prefer to wear them at any point.

Biosafety Level Information and Practices:
Taken from the CDC site: http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s2.htm

- *"**Biosafety Level 1** practices, safety equipment, and facility design and construction are appropriate for undergraduate and secondary educational training and teaching laboratories, and for other laboratories in which work is done with defined and characterized strains of viable microorganisms not known to consistently cause disease in healthy adult humans… Many agents not ordinarily associated with disease processes in humans are, however, opportunistic pathogens and may cause infection in the young, the aged, and immuno-deficient or immunosuppressed individuals. Vaccine strains that have undergone multiple in vivo passages should not be considered avirulent simply because they are vaccine strains.*
- *"Biosafety Level 1 represents a basic level of containment that relies on standard microbiological practices with no special primary or secondary barriers recommended, other than a sink for handwashing.*
- ***"Biosafety Level 2** practices, equipment, and facility design and construction are applicable to clinical, diagnostic, teaching, and other laboratories in which work is done with the broad spectrum of indigenous moderate-risk agents that are present in the community and associated with human disease of varying severity. With good microbiological techniques, these agents can be used safely in activities conducted on the open bench, provided the potential for producing splashes or aerosols is low. Hepatitis B virus, HIV, the salmonellae, and Toxoplasma spp. are representative of microorganisms assigned to this containment level. Biosafety Level 2 is appropriate when work is done with any human-derived blood, body fluids, tissues, or primary human cell lines where the presence of an infectious agent may be unknown…*
- *"Primary hazards to personnel working with these agents relate to accidental per cutaneous or mucous membrane exposures, or ingestion of infectious materials. Extreme caution should be taken with contaminated needles or sharp instruments. Even though organisms routinely manipulated at Biosafety Level 2 are not known to be transmissible by the aerosol route, procedures with aerosol or high splash potential that may increase the risk of such personnel exposure must be conducted in primary containment equipment, or in devices such as a BSC or safety centrifuge cups. Other primary barriers should be used as appropriate, such as splash shields, face protection, gowns, and gloves.*
- *"Secondary barriers such as handwashing sinks and waste decontamination facilities must be available to reduce potential environmental contamination."*

Laboratory safety and other policies:

1. Treat this room as a biosafety level 2 site.
2. Above laboratory dress rules must be followed. Any additional verbal or written instructions must also be followed.
3. No food or drink of any time is ever allowed in the laboratory. Remember what we grow in here!
4. Learn where the eye-wash, shower, first-aid, and other safety devices are placed.
5. Hair should be tied back when in lab. Pony-tails on the back of your head are safer than on top.
6. At the beginning of the laboratory session, you should clear and wipe your bench area with cleaning solutions provided.
7. Mouth pipetting is obviously strictly forbidden.
8. If you spill bacteria on your lab coat, notify me so that we may ethanol or autoclave it.
9. Report all accidents or breakage immediately. This is for your safety, not to place blame.
10. Blood and blood products can be involved in disease transmission. Place any blood-contaminated materials in a red biohazard canister.
11. Report all other spills immediately. If biological, cover with paper towels, and spray down with bleach or 70% ethanol as provided. Leave for 15 minutes before discarding. Spray and wipe the area down after discarding paper towels.
12. Gloves are available and may be advised for most laboratory procedures. Specialty gloves are available upon request to those with known latex allergies or other issues.
13. When you are doing any procedures that may splash hot or dangerous liquids, or acids or bases, you must wear safety goggles or glasses.
14. Lab benches should be clear of other items not needed for the day. It is not recommended that you put purses or backpacks on the lab surface. Use the coat rack by the entry door.
15. Tube cultures for disposal should have tape removed and placed in racks on the front cart. Plates can be directly written upon and do not need tape. They can go in the autoclave bins on the cart. If the cart is getting full, please notify me to arrange for safe disposal.
16. Slides, disposable loops and tips, and other organism-contaminated items go in the grey plastic binds on the benches. Needles and razor blades should go in biohazard sharp containers. If these get full, please notify an instructor.
17. Glass pipettes are to be placed, tips up, in the pipette container in the front of the room. If this gets full, please notify an instructor.
18. At the completion of the laboratory session, you should clear and wipe your bench area with cleaning solutions provided, clean and put away microscopes appropriately, and push in chairs completely beneath the laboratory bench.
19. Slides, plates, and other laboratory objects must not be removed from the laboratory without permission from the instructor.
20. Hands should be thoroughly with soap before leaving the laboratory.
21. During the semester, you may wish to come into the lab to check your samples. Please remember the appropriate dress rules. You must also adhere to a buddy system. At all level of lab work, it

is safer to work with someone else. Work outside of class that involves Bunsen burners should be cleared in advance.

22. There is an emergency gas shut off valve in the front of the room. Unlike others in the building, this affects this room only. If you smell gas in the lab, shut off the gas line in the front of the room immediately. If you are having troubles lighting the burner, shut off the burner and check that the gas is actually on for the room. If not, hit the reset button by the entrance door.
23. Igniting objects on fire during lab is grounds for dismissal.
24. If friends come in with you after hours, instruct them appropriately. They should not be handling anything with which they are not familiar.

LAB GRADING

Lab breakdown: 20% of your final grade if you are taking both lab and lecture

200 points = 4 open-notebook (not open-handout) quizzes, 50 points each

There will be no official lab notebook grading. Your incentives to keep a good notebook are the open notebook quizzes. Some material will come straight from what you should have written down. Other answers will require you to connect and apply what you did and learned in lab.

LABORATORY NOTEBOOKS

NOTEBOOK PURPOSE

The purpose of keeping an upper level course laboratory notebook is to:

1) Help you keep track of the experiments you carry out over the course,
2) Help you develop approaches to planning and carrying out meaningful experiments, and
3) Provide the instructor of the course with a means of providing feedback and/or evaluation of your work in the class and to assist in your learning.
4) Be able to reproduce the experiment completely from your notebook, or better yet, make it so that someone else can.
5) Because of these purposes and for safety reasons, your notebook must remain in the lab in your drawer at all times. If you need to make additional entries or notes, you may do so in the lab between sessions.

NOTEBOOK MATERIALS & NOTES

- We will maintain a chronological lab notebook method with as many details as possible. Each week you may wrap-up materials from a previous week as well as start new work.
- You may use any type of standard bound laboratory notebook. If you have room in your 227 notebook, that would be fine. Carbonless versions are not necessary for this course. A 3-ring binder is not sufficient for this lab. If you wish, you make keep a 3-ring binder in addition to your bound notebook.
- It is nice when you can find each section in your notebook easily (e.g. they are labeled as below).
- Science should not be done in a vacuum! A lot is learned by discussing a protocol in advance, such as controls you might have forgotten otherwise, or results afterwards, with a colleague.

NOTEBOOK RECORDING
All lab write-ups should include an appropriate variation of the following:

Date and a brief title

- Timing can be critical in data analysis. In addition to dating your notebook for each entry, date your lab materials.
- It is much easier to find an experiment later if you've given it a title! Sometimes an experiment number is also appropriate.

Purpose of the experiment

- Sometimes this can be as simple as "To learn about immunoprecipitation" or there may be reasons to write more in your stated purpose. Complete sentences or bullets may be appropriate, depending on your style or needs.
- This will help guide your work. In your conclusions, you should determine if you have met or your purpose or further modified it.

Procedure

- If you follow a standard protocol, such as a Gram stain, it needs to appear at least once in your notebook (probably the first day you did it). You should be able redo the experiment from your notebook. Do not simply refer to a method in the lab manual. You will almost always make adaptations, and your manual will not likely be there when you need it.
- Often it is convenient to write down what you are going to do before you do it as a plan or protocol. This can be done in a brief form and then elaborated more as you go, or you can leave room for notes as you proceed through the protocol (such as things you might do differently a second time- these could even be in a different color so you can easily find them later).
    - Include basic recipes and master mixes as well as subsequent steps as you proceed through the protocol. As you perform each task, you can check them off. This way you can go back and see if you forgot to do something (we all forget sometimes).
    - Record incubation times and temperatures, and note any mistakes, strange observations, etc. Record any deviations from the standard protocol that you take, whether the changes were intentional or not. I like annotated procedures, which may even include a diagram.
- Record your work as you go. Neat recopying is not acceptable for lab notebooks (neither is white-out or crossing out such that you can't read it). There isn't time for this in real world lab!

Observations and Results

- Record what you observe. This may include the color of the result, and how long it took. If you only record an interpretation, how do you know what the result would look like again? For example, what will "The test was positive for indole production" mean if you don't describe what led you to decide it was positive? In the real science world, you may have to interpret your data 4-6 years later. Will you be able to follow it?
- Many experiments lead to results or calculations. But don't stop there! Many researchers forget to make any conclusions. Discussing results with others is often the first step.

Conclusions

- What did your results mean? How well did the experiment work? Did you get the expected outcome? Why or why not? If not, what went wrong? Or did something go wrong at all? If there was a problem, what could you do next time to fix it? What would/could be the next step?
- What are you going to do next (or what could you do next)? For some experiments, there won't be much to say because it is part of a larger project, but you should say something at the end of each protocol, such as – "Streaked plate was placed in 35 °C incubator. Check tomorrow."
- The conclusions of an experiment can be the easiest to skip. But it can be the most useful later if you want to determine if that experiment furthered your research.